

SYSTEMS ANALYSIS FOR DEVELOPMENT DECISIONS:  
APPLICABILITY, FEASIBILITY, EFFECTIVENESS AND EFFICIENCY

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INTRODUCTION

One of the more impressive steps forward in modern problem-oriented knowledge is systems analysis. Based on earlier work in systems engineering, water resources management and operations research, the theory of systems analysis was mainly developed at The RAND Corporation and extensively put into practice under Robert McNamara in the United States Department of Defense. Following its significant success in improving some types of defense decision-making, systems analysis is now being pushed - in combination with program budgeting - on the Federal, State and local levels in the United States. Interest in systems

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analysis as a method for dealing with increasingly complex problems is also rising in a large number of modern countries, including, for instance, Canada, England, France, Israel, Italy, Western Germany and Sweden.

In view of the particularly vexing nature of development problems, their criticality and their acuteness - it is not surprising that systems analysis is also more and more regarded as an important aid for improving crucial development decisions. Especially aid-giving organizations located in modern countries - and therefore combining familiarity with modern administrative methodologies and technologies with deep concern with development problems - seem to be eager both to use systems analysis in making their program decisions (e.g., in the U.S. Agency for International Development and the World Bank)<sup>1</sup> and to help development countries to utilize systems analysis for their own decision processes (e.g., the project of the Public Administration Division of the United Nations on the application of modern management techniques to public administration in development countries<sup>2</sup>).

Certainly, if carefully adjusted and used with caution, systems analysis can be of significant help in development decisions. But there is some danger that efforts to apply

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<sup>1</sup>For a case illustrating an attempt to apply systems analysis to the Peace Corps program, see Harley H. Hinrichs and Graeme M. Taylor, ed., Program Budgeting and Benefit-Cost Analysis: Cases, Text and Readings, Pacific Palisades, California: Goodyear Publishing Company, 1969, pp. 119-139.

<sup>2</sup>See Public Administration Newsletter, No. 23 (January 1969), p. 22. Professor Bertram M. Gross serves as consultant for this project.

systems analysis for development decisions often do more injury than good, because of lack of awareness of the limits of systems analysis when applied to development decisions and insensitivity to a large variety of criteria, requisites, requirements and conditions constraining the domains of applicability, feasibility, effectiveness and efficiency of systems analysis in development countries. The limits of systems analysis in modern countries receive increasing attention,<sup>3</sup> while the even harder problems of using systems analysis for development decisions still enjoy immunity from systematic examination.<sup>4</sup>

Evaluation of the potential uses of systems analysis for development decisions involves examination of four distinct, though interdependent, issues:<sup>5</sup>

1. Criteria for applicability to development decisions of systems analysis in its present and near-future state-of-the-art. Identification of the criteria which define the domain of applicability of systems analysis involves, logically, three main steps: (a) Clarification of the domain of actual

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<sup>3</sup>E.g., see Robert Boguslaw, The New Utopians: A study of Systems Design and Social Change (Englewood Cliffs, New Jersey: Prentice-Hall, 1965); C. West Churchman, Challenge to Reason (New York: McGraw-Hill, 1968); and Aaron Wildavsky, "Rescuing Policy Analysis from PPBS," Public Administration Review, Vol. XXIX, No. 2 (March/April 1969), pp. 189-202.

<sup>4</sup>A distinguished exception is a Guest Editorial by Chi-Yuen Wu, "Modern Management Techniques for Public Administration of Developing Countries," Management Science, Vol. 15, No. 6 (February 1969), pp. B-237 to B-241.

<sup>5</sup>Elaboration of the theoretical and logical relations between these issues, while important, is out of place in this paper; it would constitute a degree of taxonomical refinement quite disproportional to the scarcity of reliable data and substantive hypotheses.

and potential applicability of systems analysis in terms of problem characteristics; (b) enumeration and characterization of the main problems faced by development decisions; and (c) identification of the areas of overlap between (a) and (b), that is the sub-set of problems faced by development decisions which are susceptible, in substance, to systems analysis.

2. Requisites of feasibility of systems analysis.

Identification of these requisites involves examination of the inputs and environments necessary to permit good systems analysis - given a problem to which in principle systems analysis is applicable - and of their availability in development countries.

3. Requirements of effectiveness. This involves, in essence, a benefit-cost analysis of systems analysis in development countries, with special attention to: (a) The possibilities of zero or negative benefits because of lack of impact of analytical studies or counterproductive impacts; and (b) the opportunity-costs of systems analysis in terms of possible other uses of very scarce and important resources.

4. Conditions of efficiency. A logical continuation of the examination of effectiveness of systems analysis (and closely fused to it by the concept of "opportunity cost"), is the exploration of the conditions under which systems analysis is efficient as a decision aid under conditions of development. This involves comparison of the benefits-costs of systems analysis with the benefits-costs of alternative modes of decisionmaking (including, as an important alternative, zero-decisionmaking). The question to be answered here is, under what conditions is systems analysis not only applicable, feasible and effective, but



also preferable as a relatively highly efficient method for improving decisionmaking.

In essence, what should be done is a meta-analysis (that is, an analysis of systems-analysis) in which the state-of-the-art of systems analysis, its infrastructure and its benefits-costs are examined in terms of development countries and development problems. But working out completely the steps of such a meta-analysis is presently impossible. This is the case for a variety of reasons, such as: the flux in the state-of-the-art of systems analysis itself and uncertainty regarding its usefulness in respect to social issues; scarcity of reliable knowledge in respect to many of the requisites, requirements and conditions of systems analysis, especially in regard to political structures and "problem-solving culture"; and the large variation in conditions and resources between various so-called "development countries," which makes any generalization of doubtful validity. But some first exploratory steps in the needed direction can be made so as to sharpen main questions, identify critical variables, and provide some tentative guides both for research and for action. The effort is necessary because penetrating meta-analysis is essential for correct use of systems-analysis in development-decisionmaking. Also, attention to the meta-analysis level in respect to systems analysis for development decisions hopefully may also sharpen understanding of the problems of applying systems analysis to social problems in so-called highly developed societies - thus illustrating the important side benefits to modern countries of studying development problems.

## APPLICABILITY OF SYSTEMS ANALYSIS TO DEVELOPMENT PROBLEMS

Systems analysis is often presented in literature in terms of methods, techniques and tools.<sup>6</sup> This is natural because it is the tools and techniques which are tangible, explicated and easily communicable. But what is much more important is systems analysis as an approach, an orientation and even - to use an apt phrase by Sir Geoffrey Vickers<sup>7</sup> - a "frame of appreciation."

Reduced to its essentials, systems analysis is an effort to apply structured rationality to problems of choice. In particular, systems analysis in its pure form involves three main elements:

- a. Looking at problems and alternatives in a broad way, which tries to take account of many of the relevant variables and of the probable results - that is, taking a "systems" view.<sup>8</sup>

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<sup>6</sup>The best recent presentations of systems analysis are: E.S. Quade and W.I. Boucher, eds., Systems Analysis and Policy Planning: Application in Defense (N.Y.: American Elsevier 1968), and C. West Churchman, The Systems Approach (New York: Delacorte Press, 1968).

<sup>7</sup>See Sir Geoffrey Vickers, The Art of Judgment (N.Y.: Basic Books, 1965), Chapter 4.

In contrast to United States applied decision theory, including most of systems analysis, which approaches decision improvement by decomposition and treatment of different decision components (such as goals, alternatives and predictions), Sir Geoffrey Vickers emphasizes the need for a holistic Gestalt view of problems. See also his recent collection Value Systems and Social Process (N.Y.: Basic Books, 1968).

<sup>8</sup>This is the meeting point of "systems analysis" and "general systems theory." Both share a desire to look at phenomena in terms of broad interrelated sets, called



- b. Searching for an "optimal," or, in practice, clearly preferable, solution among available alternatives, without being limited to incremental changes.
- c. Explicit and rational identification of the preferable alternative (or alternatives) through comparison of expected results in terms of operational goals; this is done with the help of a large set of techniques, ranging from mathematical models to human gaming and from sensitivity testing to canvassing of experts' opinions.

Taking a very broad and favorable view of systems analysis so as to include some (but not all) of the elements of policy analysis,<sup>9</sup> systems analysis has nevertheless a domain of useful applicability limited by the following criteria:

"systems." Otherwise, despite the similarities in names, there is amazingly little common ground between systems analysis and general systems theory, though there is much potential scope for mutual stimulation and perhaps even some integration. Some fusion between general systems theory and systems analysis may be found in systems engineering, e.g., see Arthur D. Hall, A Methodology for Systems Engineering (Princeton, N.J.: D. Van Nostrand Company, 1962). A more recent effort is Van Court Hare, Jr., Systems Analysis: A Diagnostic Approach (N.Y.: Harcourt, Brace & World, Inc., 1967). General systems theory is well presented in the following recent books: Ludwig von Bertalanffy, General Systems Theory: Foundations, Development, Application (New York: George Braziller, 1968); F. Kenneth Berrien, General and Social Systems (New Brunswick, N.J.: Rutgers University Press, 1968); and Walter Buckley, ed., Modern Systems Research for the Behavioral Scientist (Chicago: Aldine, 1968).

<sup>9</sup>See Yehezkel Dror, "Policy Analysis: A New Professional Role in Government Service," Public Administration Review, Vol. XXVII, No. 3 (September 1967), pp. 197-203.

- a. Goal operationability. Goals must be sufficiently concrete to serve as operational criteria for identifying and, on some scale, comparing probable results of the different alternatives.
- b. Results predictability. Most of the results of the main alternatives must be predictable, at least in probabilistic form. Therefore, some "models" to work out the probable results of alternative decisions are required.
- c. Alternative availability. Alternatives which will prove to be "good enough" by some acceptance level standards must be available, or easily synthesizable from available alternatives.

Insofar as these criteria are correct - and in respect to the present state of the art of systems analysis they are, if anything, too lenient, by not including the criteria of quantifiability - then at least the following types of problems are outside the main domain of applicability of systems analysis:

- a. Value judgment, including determination of value mixes to be aimed at, and contextual goals not to be impaired; and basic value judgments in respect to policy strategies on acceptable levels of risk-taking and attitudes to time.
- b. Predominantly political problems, where the main desired results are consensus, "nation building," coalition maintenance, and political power recruitment.<sup>10</sup>

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<sup>10</sup>For a very interesting exploration of the interfaces between analytical modes of decisionmaking and "political"

- c. Disequilibrium policies, where the main aim is to shock a system into changing, rather than carefully controlling the directions of change.<sup>11</sup>
- d. Radical innovation policies, where the main elements of progress are invention of new ideas, social experimentation and learning feedback - rather than comparison of expectations in respect to available or easily discoverable alternatives.
- e. Implementation issues, where a "technically" preferable decision is easy to identify, but its implementation requires changes in institutions and new institution building.

Application of my short, positive and negative, characterization of the domain of usefulness of systems analysis to some main development decision problems provides some indication of the potential role of systems analysis for development decisions. (See Table One - Potential Uses of Systems Analysis for Development Decisions, page 10.)

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modes of decisionmaking, see Charles L. Schultz, The Politics and Economics of Public Spending (Washington, D.C., The Brookings Institution, 1968).

<sup>11</sup>The systems analysis approach and the comprehensive planning attitude are closely related in their interest in systems views and systems changes. When non-balanced growth is preferable, much of the appeal of both systems analysis and comprehensive planning is therefore lost. See Albert Hirschman, The Strategy of Economics Development (New Haven: Yale University Press, 1958) and my article "Comprehensive Planning: Common Fallacies versus Preferred Features," in F. van Schagen, ed. Essays in Honor of Professor Joe P. Thijsse (The Hague: Mouton, 1967), pp. 85-99.

Table One

## APPLICABILITY OF SYSTEMS ANALYSIS TO DEVELOPMENT PROBLEMS

Problem Area	<u>Systems Analysis Quite Useless</u>	<u>Systems Analysis Somewhat Helpful</u> (if requisites and requirements are met)	<u>Systems Analysis Very Helpful</u> (if requisites and requirements are met)
Agriculture	Land reform; aggregate resources commitment; internal political implications; degrees of innovation; degrees of diversification; main development directions; foreign implications; attitudes to work.	R&D; land reallocation, training; monitoring system.	Land use and product mix; irrigation, distribution and marketing systems.
Culture	"National Identity"; encouragement of indigenous art and creative crafts; attitudes to rationality; metaphysical, social & political values; language; problems of polyethnics; clash between traditional and modernizing values; and more.	Some aspects of written language development; some aspects of mass communication.	None
Defense	Main goals; aggregate resources commitment; basic internal political implication; strategies & basic weapons choice; internal problems of army politics; external aid and procurement opportunities.	Estimation of protection needs; detailed resources allocation; force composition; defense R.D.&E; defense production.	Low-level weapon mix; logistics & some manpower problems.
Education and Manpower	Main directions of effort (cadre training, mass education, technological education, etc.); political & ideological implications; aggregate resources allocation; basic contents; teacher development; propensities to innovate; relations with basic economic, social and foreign policies.	Learning method and devices; "Brains Drain"; educational network interconnections; location of facilities; teaching-manpower utilization; curriculum programming; parts of manpower planning; facility planning.	Facility programming and utilization.
Foreign Relations	Main goals; resources commitment; internal political implications; basic strategies & involvements.	Some predictions of exogenous variables; some country investment benefit-cost estimation.	Some aspects of external presentation network (e.g., location, communication, logistics).
Health	Aggregate resources commitment; main directions of effort; basic structure (public insurance, etc.); problems of "health culture," health habits & healing traditions; recruitment & handling of foreign aid; concepts of "healthy person"; political & professional aspects (e.g., feasibility of using "nonprofessional" in treatment).	Some aspects of treatment systems; some aspects of training of professionals; medical R&D; facility planning.	Facility programming and utilization.
Industrialization	Main directions of effort; risk policy; resources commitment; basic strategy (public initiative, encouragement of private enterprise, etc.); external aid recruitment and handling; attitudes to work.	Project choice; R&D policy; monitoring system; interdependence handling; marketing planning.	Project programming.
Internal Politics	"Nation building" strategies; coalition building & maintenance; leader recruitment & development; political cohesion; elite transformation; propensities to innovate; political ideologies & values; consensus on rules of succession; conflict management; transfers of power to modernizing agents; handling of polyethnic groups, & more.	Communication and political socialization networks; some problems of internal security.	None
Population	Basic approach; ideological, cultural & political feasibility; resources commitment; external implications and pressures.	Alternative methods comparison; information and propaganda system; incentive system; monitoring system.	Distribution network



The main conclusion emerging from this application can fairly be summarized as follows: Systems analysis can be of significant help in dealing with many important low-level and medium-level decisions, as well as high-level sub-optimized problems - such as decisions on individual projects.<sup>12</sup> But all broader top-level problems are beyond systems analysis in its present form. Also, most of the sub-components of top-level problems (including project decisions) cannot be dealt with correctly by systems analysis until some basic strategy issues are determined by other methods and until much creative invention of new alternatives takes place. Furthermore, even in respect to many medium-level and some low-level problems, resolution of strategy problems and alternative invention are often necessary before systems analysis applies usefully.

Here we have one of the differences between policy-making needs in modern countries and in development countries: In development countries basic features of society, central trends in social strategies, and fundamental system characteristics are themselves main targets for change-oriented policies and - whether more or less influenced by our explicit desires and actions - must be expected to change in quite unpredicted directions. Therefore, focusing better decisionmaking on sub-levels where systems

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<sup>12</sup>On the uses of systems analysis for project decisions and management, see David I. Cleland and William R. King, Systems Analysis and Project Management (New York: McGraw-Hill, 1968). As project decisions are a very important component of development policies, they provide an opportunity for significant systems analysis, if the soon-to-be-discussed requisites, requirements and conditions can be met.

analysis is easier to apply often makes little sense and in many cases may be counterproductive - by allocating very scarce decision-improving resources to wrong issues and creating political-social investments which it will be impossible to "write-off" when their underlying assumptions are exposed as incorrect or outdated. One urgent need before systems analysis is applicable to development problems is, therefore, ways for better policymaking in respect to basic social issues and under conditions of extreme uncertainty and absence of good alternatives.<sup>13</sup>

This tentative conclusion concerning the limited applicability of systems analysis to development decisions is strongly aggravated by examination of the infrastructure requisites and requirements and the efficiency conditions.

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<sup>13</sup> These conditions apply not only to underdeveloped countries, but to "underdeveloped" segments within highly developed societies, including some main components of the cluster often called "urban problems." Also, changes in ideologies, expectations and technology may require in modern countries explicit and innovative policies in respect to basic social characteristics. Therefore, many of the tentative conclusions of this paper may apply, in principle, to important social problem areas in, for instance, the United States.

On the trend in highly developed societies more to engage in conscious self-direction see Amitai Etzioni, The Active Society: A Theory of Societal and Political Processes (N.Y.: The Free Press, 1968).



FEASIBILITY REQUISITES, EFFECTIVENESS REQUIREMENTS  
AND EFFICIENCY CONDITIONS

Some requisites of systems analysis, without which good systems analysis is not feasible, are quite clear and tangible, while others are more complex. Proceeding from the more simple to the more complex, at least seven main requisites in respect to what can conveniently be regarded as the needed "infrastructure" of systems analysis (but not only of systems analysis) can be identified:

1. Availability of professionals able and willing to undertake high-quality systems analysis.
2. Availability of data on which analysis can be based.
3. Availability of valid theories, which permit at least some reliable predictions on probable results of different available or easily discoverable alternatives.
4. Sufficient political cohesion to reach agreement on some operational goals.
5. Existence of basic agreed-upon contextual values and policy strategies (e.g., on attitudes to risk and time).
6. Existence of sufficient power support for analysis units to get access to required information.
7. Existence of political-organizational institutions stable enough to maintain analytical activities.

Much more diffuse are some of the requirements of systems analysis effectiveness, in the sense of having any probability of impact on policies, and of efficiency, in the sense that allocation of resources to systems analysis is justified in terms of probable impact of systems analysis on real policies, in comparison with other modes of improving policies using the same or competitive resources. At least six such main requirements and conditions can be identified:

1. Absence of acute crises, which monopolize attention and prevent long-term spans of attention.
2. Existence of real choices, in the sense (a) that choices are not dictated by external power centers (e.g., foreign aid limited to specific uses) and (b) that different alternatives are not clearly equifinal, that is, lead to the same - or equivalent - results. (E.g., when the goal is to disequilibrate, never mind in what way.)
3. Sufficient strong and controlled implementation capacity to assure influences of decisions on action.
4. "Nation-building" sufficiently advanced not to require dominant, or even exclusive, attention.
5. Readiness to innovate, or at least openness to consider new alternatives, on behalf of policy-making elites.
6. Acceptance of "rationality" by policymaking elites as a useful approach to problems, as contrasted, for instance, with rigid doctrine, führer ideology, or belief in astrology.

A special additional requirement, to be discussed at length later on, is that the quality of other components of the public policymaking system is high enough to permit synergetic relations with systems analysis, or at least to prevent complete neutralization or significant boomerang effects.

Admittedly, my categorization is too sharp: In reality, requisites, requirements and conditions are often satisfied in various degrees in respect to different problem areas and a variety of political-organizational contexts. Therefore, in respect to any concrete country, the questions are not if to use systems analysis, but rather inhowfar and where to use it and what efforts to make in order to better meet the requisites and to satisfy the requirements and conditions.

Recognizing these limits of my diagnosis, I tend nevertheless to the impression that not only are many requisites of systems analysis largely unsatisfied in many development countries,<sup>14</sup> but also the circumstances in many of the development countries often make systems analysis a quite ineffective and inefficient mode for decisionmaking. (See

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<sup>14</sup>Again, many parallels exist between development countries and developed countries. For instance, one of the weaknesses in the efforts to introduce PPBS and analysis in the federal agencies of the United States is the low level of efforts to train systems analysis professionals, and thus to meet a critical requisite. To take a more fundamental issue: In respect to some (but not all) components of the "urban problems" or "student problems" clusters, some of the basic requisites, requirements and conditions of effective and efficient systems analysis may be underdeveloped - such as valid theories, agreement on contextual values and policy strategy, and even acceptance of rationality.

Table Two - Satisfaction of Feasibility Requisites, Effectiveness Requirements and Efficiency Conditions of Systems Analysis in Development Countries, page 17.) This does not imply that systems analysis is not one of the useful approaches to be utilized in development decisions, but that other things must and should often come first. In particular, "nation building," encouragement of pro-innovation and rationality-oriented political and organizational institutions, and basic policy strategy determination - all are essential antecedents of useful (feasible, effective, and efficient) systems analysis.

Table Two

SATISFACTION OF FEASIBILITY REQUISITES, EFFECTIVENESS REQUIREMENTS, AND  
EFFICIENCY CONDITIONS OF SYSTEMS ANALYSIS IN DEVELOPMENT COUNTRIES

<u>Feasibility Requisites</u>	<u>Degree of Satisfaction in Development Countries</u>
Availability of professionals	Very scarce to completely unavailable
Availability of data	Very scarce to completely unavailable
Availability of theories as basis for predictions	Very scarce to completely unavailable
Political cohesion permitting agreement on operational goals	Varies from high to low, more often low
Agreed-upon contextual values and policy strategies	Varies from medium to low
Power support for access to information by analysis units	Sometimes medium; more often low
Stable political-organizational institutions to maintain analysis	Sometimes medium; more often low
<u>Effectiveness Requirements and Efficiency Conditions</u>	
Absence of attention absorbing crises	Varies; in most cases very low
Existence of real choices	Varies from high to low
Implementation capacity assures influence of decision	Sometimes medium; more often low to very low
"Nation-building" does not absorb all attention	Low to very low
Readiness to innovate	Verbally high; actually often low
Acceptance of rationality	Varies; in most cases low to very low
Quality of other components of policymaking-system permits synergetic relations with systems analysis; or at least prevents complete neutralization or boomerang effects	Sometimes medium; in most cases low to very low

Note: This Table presents subjective judgment based on available literature, which itself tends to be impressionistic. It is, therefore, only of suggestive significance. Research to produce reliable data on the relevant variables is urgently needed.



FROM SYSTEMS ANALYSIS TO POLICYMAKING IMPROVEMENT

Many of the conditions for systems analysis feasibility, effectiveness and efficiency involve basic features of society, partly well beyond conscious human control, and partly depending on extra-rational modes of social direction - such as charismatic leadership and prophetic inspiration. But a lot remains to be done through rational approaches, in the broad sense of the term which includes also recognition and encouragement of essential extra-rational elements of better policymaking, such as creativity and propensities to innovate.<sup>15</sup>

Looking at the central issues facing development countries and on their basic conditions, systems analysis emerges as one of the methods for dealing with some only of the development problems, and not the more fundamental ones. Insofar as rationality and knowledge can contribute to development decisions, much more seems to be needed than introduction of systems analysis: The whole policymaking system must be improved and often redesigned, and even nova-designed (i.e., designed anew), to gain the capacities of applying rationality (including rationality-supported extrarationality) and knowledge to the main problems and to gain the intent to do so.

Even when systems analysis is applicable and feasible, effectiveness and efficiency of systems analysis depend on

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<sup>15</sup> See Yehezkel Dror, Public Policymaking Reexamined (San Francisco: Chandler, 1968), Part IV, for an extended examination of the roles of rationality and extrarationality in preferable policymaking.



overall changes in the public policymaking system for another reason - namely the problem of thresholds for achieving any significant impact on policymaking:<sup>16</sup> To avoid neutralizing counter-adjustments, the use of systems analysis must be accompanied by broader systems changes and should, preferably, be part of a more comprehensive policymaking-improvement effort.<sup>17</sup> In modern countries synergically interacting developments of the feasibility requisites and improvements in the policymaking system are sometimes (though far from always) the result of independent activities by pluralistic actors. In this case, systems analysis can become increasingly useful and should be pushed, with the necessary changes in the infrastructure of systems analysis and in the relevant other components of the policymaking system being monitored, but not requiring central intervention and direction. But in development countries such semi-spontaneous evolution of the needed analysis infrastructure and needed improvement of the policymaking system cannot be expected.

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<sup>16</sup> See my papers "Some Normative Implications of a Systems View of Policymaking," Proceedings of the 14th Annual Meeting, The Society for General Systems Research (1969, in print). (Earlier version RAND paper P-3991-1, February 1969) and "PPB and the Public Policymaking System - Some Reflections on the Papers by Bertram M. Gross and Allen Schick," Public Administration Review, Vol. XXIX, No. 2 (March-April, 1969), pp. 152-154. (Earlier version RAND paper P-3999, December 1968.)

<sup>17</sup> Two very important articles with strong insights into the necessity of moving from a narrow PPB-systems analysis syndrome to broader improvements, are Bertram M. Gross, "The New Systems Budgeting," Public Administration Review, Vol. XXIX, No. 2 (March-April, 1969), pp. 113-137, and Aaron Wildavsky, "Rescuing Policy Analysis from PPBS," *op. cit.*

The conclusion that broad improvements in the policy-making system of development countries are not only essential by themselves, but often necessary to make systems analysis applicable, feasible, effective and efficient seems inescapable. This finding does not imply that some utilization of systems analysis for development decisions<sup>18</sup> may not be quite useful, especially in respect to individual projects. Indeed, sometimes constraints on other possibilities may be so rigid that this is the best that can be done to improve development decisions, even though a very poor best. But what should be aimed at by the development countries and those agencies who try to help them, is to achieve more really significant improvements in the decisionmaking patterns - and this will not be done by encouraging systems analysis. Rather, what is needed is intense and sustained effort to improve policymaking as a whole - including also satisfaction of the applicability criteria, feasibility requisites, effectiveness requirements, and efficiency conditions of systems analysis. As many of the criteria, requisites, requirements and conditions of systems analysis are also essential for other policymaking improvements, we have here a really interdependent set of needs providing an opportunity for mutually supportive highly significant improvement activities.

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<sup>18</sup>I am dealing in this paper with development decisions, whether by development countries or by aid-giving agencies. Quite a different meta-analysis applies to aid-decisions evaluated in terms of criteria internal to the aid-giving agency or country. For instance, different issues concerning the uses of systems analysis are raised by its uses in "aid-decisions" aimed primarily at propaganda and military goals of the aid-giving country.

Required activities move in at least three directions: (1) advancing relevant knowledge; (2) building up the infrastructure for systems analysis and other policymaking improvements; and (3) reforming the policymaking-system as a whole by redesigning and nova-designing sets of mutually reinforcing main components.

Clearly, advancing knowledge on development problems on one hand and on better methods and designs for development-decisions and development-policymaking on the other hand is a basic and urgent need. A main part of this need is to develop a method of policy analysis, which can do for high-level strategy problems what systems analysis does for lower level "tactical" problems.<sup>19</sup> To take a broader perspective, we need - to use an apt term by Harold D. Lasswell - a "Policy Sciences of Development."<sup>20</sup>

This in turn requires quite new types of research organizations and study designs, as policy sciences knowledge seems to require forms of interdisciplinary cooperation and of fusion between theory and application, which are more characteristic of policy research organizations than of traditional university structures. It is somewhat disturbing to realize that, despite the tremendous importance of development problems and the large amount of work being

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<sup>19</sup>The concept of policy analysis and its problems are treated at greater length in my paper "Policy Analysis: A Theoretic Framework and Some Basic Concepts," Santa Monica: The RAND Corporation, P-4156, July 1969.

<sup>20</sup>See Harold D. Lasswell, "The Policy Sciences of Development," World Politics, Vol. XVII, No. 2 (January 1965), pp. 286-309 (also published as Yale Papers in Political Science, No. 18).

done on them, there is no large RAND, Hudson Institute or Urban Institute-type policy research organization devoted to development issues.<sup>21</sup> Establishment of a number of such development policy research organizations seems absolutely essential for building up development-policy-improvement knowledge and its systematic application to concrete development decisions.

Intense efforts to advance the policy sciences of development are essential and, in the longer run, may provide the only basis for putting development policies on a solid basis of knowledge. But action cannot wait till knowledge becomes more advanced, and need not wait; enough knowledge - experienced based as well as theory supported - is already available today to improve development decisions and development policymaking.<sup>22</sup> This includes, inter alia, available knowledge in systems analysis itself which, as noted, can be of importance in its present state-of-the-art. But, in order to use systems analysis and in order to go beyond it to multi-dimensional improvement of the policymaking systems in development countries, the necessary infrastructure must be built up. Some parts of this infrastructure - again, as already noted - are beyond direct effective intervention with available knowledge and tools. This, for instance, is the case in respect to attitudes to rationality and readiness to innovate. But much can be done in respect to other

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<sup>21</sup>A significant effort in this direction is the United Nations Institute for Training and Research. But, as yet, its resources are inadequate.

<sup>22</sup>See Amitai Etzioni, "'Shortcuts' to Social Change," The Public Interest, No. 12 (Summer 1968), pp. 40-51.



critical features of the systems analysis (and policymaking-improvement) infrastructure, with possible indirect impacts also on those features beyond direct intervention. In particular, professionals can be trained and parts of the political elites can be exposed to relevant knowledge and orientations.

It is hard to overemphasize the importance of preparing new types of professionals for development-decision-improvement. The dearth of good comprehensive systems analysts who are capable of moving in the direction of policy analysis and policymaking-improvement as a whole, is one of the most important constraints on the successful application of analysis to complex social issues in modern countries. Development countries need even more qualified professionals and have much less of them.<sup>23</sup> Indeed, the situation here is a strong demonstration of what I like to call the Malthus-Dror Law: While the difficulties of problems increase at a geometric rate, the manpower qualified to deal with these problems develops at an arithmetic rate.

Therefore, an urgent need exists for establishment and strengthening of special training institutes which focus on the preparation of "development policy sciences" professionals. Many components of the necessary programs exist already in development-oriented teaching programs in Europe (e.g., at the Institute of Social Studies at The Hague), the United States (e.g., at the Graduate School of Public and International Affairs, University of Pittsburgh),

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<sup>23</sup>The intense demand for such high-quality professionals in the developed countries, and the United States in particular, aggravates the difficulties for the development countries by (a) providing a strong incentive for "brains drain" and (b) making recruitment of the better experts for longer assignments in development countries very difficult.

and other countries (e.g., the Graduate Program in Planning at the University of Puerto Rico). But none of the existing programs squarely meets the needs of advanced training in development policy sciences. Quite a number of new schools are being set up, especially in the United States, to prepare new professionals to deal with the policy problems of modern societies (e.g., the Doctorate Program in Policy Sciences at the State University of New York at Buffalo; the Program in Public Policy at the John F. Kennedy School of Government at Harvard University; and the Program in Social Policy Planning at the University of California, Berkeley). Establishment of such programs for development needs might be a major step in building up a critical part of the infrastructure necessary for the application of systems analysis to development decisions, and for development-policymaking-improvement in general.<sup>24</sup>

A separate and even more challenging necessity is to convey to the political elites at least some appreciation of methods and approaches of policymaking-improvement, ranging from systems analysis to development policy sciences. However unconventional, I think we should and can have courses for politicians from development countries. This is possible within many given basic values and ideologies, for instance by encouraging politicians after their election and/or appointment to engage in studies,

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<sup>24</sup>See my paper "Teaching of Policy Sciences: Design for a Post Graduate University Program" (Santa Monica, California: The RAND Corporation, P-4128, June 1969). To meet the special needs of development, some elements must be added to the proposed design, including, among others: intense study of development situations and change theories; emphasis on "nation building" issues; and more involvement with implementation structures and execution problems.



paid for by the government or by external aid. Design of suitable courses for politicians from development countries is one of the urgent needs.<sup>25</sup>

Search for additional knowledge and preparation of parts of the needed infrastructure are essential. But also absolutely necessary is extensive reform of the policymaking system.

To illustrate, let me mention five main lines of reform in the public policymaking system, which seem essential for the improvement of development policymaking and also for providing the requirements and conditions for effective and efficient use of systems analysis:<sup>26</sup>

1. The operations of the highest political decision-making organs, such as the president, prime minister and cabinet, should be improved through  
(a) restructure of information input; (b) provision of staff aids for analysis; (c) monitoring of implementation results; and (d) changes in deliberation preparations (e.g., background papers and briefings).

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<sup>25</sup>Very relevant are the ideas presented in Saul Katz, "A Model for Educating Development Administration," Public Administration Review, Vol. XXVIII, No. 6 (November-December 1968), pp. 530-538. For an illustration of the design of a broad course for development politicians, see Yehezkel Dror, "The Improvement of Leadership in Developing Countries," Civilizations, Vol. XVII, No. 1/2 (1967), pp. 72-82.

<sup>26</sup>The systematic theoretic basis for these recommendations is presented in my book Public Policymaking Reexamined, op. cit. The illustrations are taken from my paper "Accelerated Development and Policymaking Improvement," to be published in Civilizations. (Earlier version RAND paper P-4021, March 1969.)

2. The macro-structure of the government should be subjected to reconsideration, including the number of ministries, the composition of the cabinet (e.g., ministers without portfolios), the relations between different levels of government, the role of quasi-government agencies, etc. This reconsideration should look at the picture as a whole and from above, focusing on basic features and not the details of sub-structure and procedure.
3. The higher civil service patterns should be reconsidered, with special attention to their policy functions. For instance: easy interchange between governmental, other public, quasi-public and perhaps private organizations and compulsory rotation in the government seem essential for preserving imagination and readiness to innovate. Fixed-term appointments and freedom to engage in various forms of political activity may well meet better the needs of some development countries than the British-type career civil service patterns. Academic training in policy sciences is preferable for the policy level civil servants, requiring real changes in the management and administrative technique orientation of many of the training centers in and for development countries.
4. Social science and analysis professionals should serve as central staff officers for policy issues, in addition to and instead of the traditional civil servants, budget officials and economic feasibility examiners. A special profession of "development policy scientists" or "development policy

analysts" may be required, as already indicated, for heading staff analysis units working on the higher policy level in the main ministries, on the cabinet level and for the legislature (if the latter has autonomous policymaking functions).

5. Policy-oriented research and study in the involved country should be encouraged by establishment of special interdisciplinary policy research organizations and by motivating local universities to focus on national policy-relevant research. The policy research organizations should enjoy considerable freedom in their studies, but maintain confidential relations with the government.

This is a rather general list, application of which to the concrete conditions of a particular country requires delicate field-work and careful design of preferable policymaking-system models, fitting the specific circumstances and needs, with much attention to limits of feasibility, including political feasibility. But, hopefully, the list does provide some operational context to my overall conclusion on the limits of systems analysis as a lonely rationality-based method in development decisions and the necessity instead to proceed on a wide band of policymaking-improvements, in which systems analysis is only one, though an important, component.

